Ontario. Legislature assembly. [Committee]
Select committee on air pollution and smoke control.

Interim report [...] 1956

INTERIM REPORT

of the

SELECT COMMITTEE, APPOINTED BY THE ONTARIO LEGISLATURE, TO ENQUIRE INTO CERTAIN MATTERS AND LEGISLATION REGARDING SMOKE CONTROL AND AIR POLLUTION.

Mr. Alfred H. Cowling, Chairman.
Mr. W. Elmer Brandon, Q.C.,
Mr. Robert E. Elliott,
Mr. George T. Gordon,
Hon. Philip T. Kelly,
Mr. Robert W. Macaulay, Q.C.,
Mr. Ellis P. Morningstar,
Mr. William Murdoch,
Mr. Thomas D. Thomas,
Dr. Frederick A. Evis, Secretary.

Appendix "A"

ONTARIO

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February 29th, 1956.

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To The Honourable the Legislative Assembly
of the Province of Ontario.

Honourable Members:

We were appointed on September 8th, 1955, during the First Session of the Twenty-fifth Legislature, on motion of Mr. Frost, seconded by Mr. Porter, with the following terms of reference -

> "To examine existing legislation and practice in relation to smoke control and air pollution in Ontario with particular reference to the installation and maintenance of equipment to control smoke and air pollution and methods and ways of extending public information in connection therewith."

Since our appointment we have diligently pursued our studies of this matter, but there has not been sufficient time to either finish an adequate general survey of the problem, or to inspect the particular conditions which exist in several Ontario municipalities where inspections are desired. We have nevertheless gained a vast amount of knowledge about air pollution and all of us realize that it is by no means a trivial and unimportant problem. On the contrary, it is one which affects directly or indirectly every citizen in Ontario and it is one which must be faced squarely, handled competently and fearlessly, and eradicated as completely as possible as soon as possible.

Each individual, depending upon his size and amount of activity, uses from 8,000 to 16,000 quarts of air per day. We have put long years of effort into obtaining adequate pure food laws and are continually spending large amounts of money to make sure that these laws are rigorously enforced. It has cost us millions to make certain that we have pure water to drink in our municipalities. Yet for generations we have been content to inhale several thousand gallons of contaminated air every day. The importance of having clean pure air to breathe cannot be overemphasized. Smoke and smog are wasteful extravagances that no one can afford.

It is more expensive to put up with polluted air than to pay the price of having air worth inhaling.

In referring to our subject in the report which follows, we will use the term "air pollution" almost exclusively. This is for two reasons. Firstly, this term necessarily includes "smoke" as being one type of air pollution. Secondly, because the techniques for controlling smoke emissions have been pretty well mastered for us elsewhere in the world.

Hence, smoke should be no great problem in Ontario. It can be eliminated if we will take the trouble and spend the money to eliminate it. When any part of our Province is blanketed with smoke particles it is not because of any lack in technical control knowledge. The trouble lies with our laws and by-laws and the efficiency with which they are enforced, combined with a lack of public spirited co-operation and a disregard for the welfare of the members of the surrounding community on the part of the offender.

What we are really worried about is not so much ordinary smoke, but the hundreds of other kinds of air pollution, many of which are invisible. The problem of air pollution control is completely different from what it was ten or even five years ago. In the last five years the petrochemical industry has developed in amazing ways, the chemical manufacturing industry has been growing at a faster rate than all the rest of our industries, and the number of automobiles on our roads has increased by more than 52 per cent.

There is absolutely no reason to believe that our sources of air pollution will decrease in number, or diminish in their output in the future, without control. There is every reason to think that they will increase in number and in kind, and will grow in concentration. Uncontrolled, the quality of our air is certain to become steadily worse.

Air, like water, is a limited natural resource. It has taken us a long time to realize that there is a limit to the amount of man's garbage air can absorb and still be suitable for living in. Many catastrophic incidents throughout the world

have demonstrated that there is also a limit to the amount the air can absorb and still sustain life.

We have come to the conclusion that air pollution is a serious, dangerous and costly curse of civilized living. It presents a problem which is gigantic, complex and constantly growing with the increasing population, urbanization, industrialization and prosperity of our Province. The effort and co-operation which will be required from all levels of Government and from each citizen to assure us of clean air to breathe is the price which we must pay for the convenience of our modern way of life. If this effort is not made it is inevitable that much of the benefit of our urbanized living will be negated by discomfort, disgruntled dispositions, disease and premature death.

Air pollution can and does have a detrimental effect on the physical and mental health, the efficiency and the well-being of people who must exist in it. There is considerable evidence to indicate that it is one of the principal causes for the growing incidence of lung cancer. It certainly predisposes the individual to other respiratory illnesses and to cardiac trouble, and makes his recovery protracted, or his complaint chronic. It can cause sudden death and has produced many episodes throughout the world which have resulted in large numbers of fatalities.

Air pollution may be an obvious nuisance, or in some cases it may be almost imperceptible to the senses of the average individual living in it until the concentration of the pollutants finally reaches the threshold stage of becoming offensive and irritating. Then everyone exposed will demand immediate relief which cannot possibly be provided in a reasonable length of time. To be satisfactory, action to prevent air pollution must be taken long before the situation becomes severe enough for the general public to realize how much they are being affected. In this case, incidentally, prevention is far cheaper than the cure.

Air pollution always obliterates an appreciable percentage of the sun's beneficial rays. It can easily impair visibility and may do so to the

extent that it becomes a danger to, and cause of accidents in, air and ground travel. Depending on the severity, air pollution also removes some or most of the sterilizing action, and other benefits of the sun's radiation, and can in this way contribute to the spread of disease germs. Measurements traced by identical illuminometers, one at Malton and another on the roof of a building on University Avenue in Toronto, on a recent day, show that, on that occasion, Toronto smog cut down the intensity of sunlight in the city as compared to that at Malton by more than 50 per cent. There were no clouds in the sky when these measurements were taken. Elsewhere the percentage of smog sun loss has been 75 per cent and greater.

The soiling and corrosion effects of air pollution produce great damage to buildings, equipment and machinery, fences, furnishings, furniture and clothing; shortening the useful life of these things and impairing their beauty.

Air pollution can result in damage to vegetation varying from complete death to so-called "imperceptible" damage, which means the crops and plants are smaller and of inferior quality, but otherwise appear normal. Because air pollution can be carried by air currents for many miles, farms at great distances from the sources of pollution can be affected.

Air pollution is frequently evidence of wasted fuel or of the loss of valuable elements. It can have other very substantial economic consequences to every industry and individual in Ontario. Therefore, equipment for the control of air pollution emissions frequently will pay for itself in a short number of years and sometimes does produce a profit.

Air pollution is also an evidence of bad manners. It is not proper to dump your garbage on your neighbour's land. Neither is it lawful. We have heard it said that smoking chimneys are necessary for prosperity, but we have seen that industry does not have to be bad mannered to be profitable. In fact, bad mannered industry drives good mannered industries out of an area. For example, you cannot operate a precision machine factory next door to an uncontrolled battery of coke

ovens. Bad mannered industry usually employs a relatively small number of people for the area it occupies. Good mannered industry employs a large number of people for the area it occupies. We are convinced that every industry can clean itself up with the proper guidance. We believe that no industry wishes to be labelled a "bad-mannered industry". Most people want to be good neighbours. Good neighbours are the best neighbours and bring the most profit to the municipality.

The authorities and the people of Great Britain have been struggling with the control of air pollution in that country for over 700 years. In the United States of America millions of dollars are being spent annually by Federal, State and Municipal authorities, as well as by private industry, to provide solutions to air pollution difficulties. It would be a conservative estimate to say that in the next five years our friends to the South will spend more than fifty million dollars on air pollution research alone, without even considering the immense cost of control equipment which will be purchased and installed. The fact that the United States Federal Government has made available for research in this field the sum of five million dollars per year, for each of the next five years, indicates the tremendous importance which is attached to the problem of air pollution by all the best experts across the border.

Your Committee wishes to be able to give Ontario the benefit of as much of the valuable and expensive experience of others as it can acquire. Because the problem is so vast, so difficult and so involved, and the implications are so many and so important, it would have been absolutely impossible for anyone to complete a satisfactory study in this field during the few months in which our Committee has been in existence. To investigate fully all the facets of this vital issue must necessarily require more time than we have had. We desire to make further investigations and to give the matter full and mature consideration before making final positive recommendations to this House.

To that end, we think it desirable to submit an interim report on this occasion and to request the continuance of this Committee.

We have the honour to do so herewith.

Alfred H. Cowling, Chairman.

W. Elmer Brandon, Q.C.

Robert E. Elliott.

George T. Gordon.

Hon. Philip T. Kelly.

Robert W. Macaulay, Q.C.

Ellis P. Morningstar.

William Murdoch.

Thomas D. Thomas.

The Committee having unanimously agreed upon this Report, Mr. Speaker, I move its adoption.

Alfred H. Cowling, Chairman.

INTERIM REPORT

OF THE

SELECT COMMITTEE OF THE ONTARIO LEGISLATIVE ASSEMBLY

ON

AIR POLLUTION AND SMOKE CONTROL

1. INTRODUCTION

Members of this Committee, as representatives of the general public of Ontario, were appointed without any previous specialized knowledge or training in air pollution and smoke control matters. Therefore the following report is condensed from and represents statistical, technical and other types of evidence which has been accumulated by us from specialists and experts who are recognized with high repute in this field.

Also, of course, we have received the benefit of representations which have been made by private individuals and various groups of citizens of our Province, and we have recorded for further consideration the practical problems which atmospheric pollutants have caused them to suffer.

We wish to thank sincerely all those who have co-operated with us in our investigations and who have given so generously of their time, their facilities and their knowledge and experience for our benefit. Our sources of information have received individual credit in our Proceedings and, therefore, we will not take the space to list their names again here.

Certain aspects of this subject appear to be controversial. There are some on which we have not been able, as yet, to acquire sufficient information and experience. Reference to several of these things has been omitted from this report because we do not feel qualified to comment upon them at this stage of our investigations.

One conclusion, however, is undeniable. The expression "free as the air you breathe" is as antiquated as the coal oil lamp. Air costs each one of us a substantial amount of money one way or another. It is much more expensive to put up with polluted air than to pay the price of having air that is worth inhaling.

2. METHOD OF ATTACK

It appeared to this Committee from the start that the most effective, logical and economical attack on the problems presented to us should begin with the discovering, recording and assessing the tremendous volume of facts which are at present known concerning Air Pollution and Smoke Control.

Air Pollution problems have arisen and been tackled in an assortment of ways in many countries, for example: Great Britain, United States of America, Australia, Japan, Italy, Holland, South Africa, India and Germany. Your Committee wishes to benefit from the experience acquired by others elsewhere, and to avoid the pitfalls into which some of them have stumbled in their struggles to obtain clean air. We have already gathered many scientific and statistical reports and a large amount of other information which demands much more time for reading and careful evaluation.

There is still a great fund of technical knowledge and practical observation easily available to us which we have not had the time to accumulate, but which certainly should be acquired. Therefore, it is vitally important that we be permitted to continue our observations for a further reasonable period so that we will learn sufficient truth about the matter for our final recommendations to be useful and sound.

3. SUMMARY OF COMMITTEE'S ACTIVITIES WITH COMMENTS

This Committee has visited and studied conditions in six metropolitan areas in Ontario and four in the United States of America. Discussions were held with various professional staff members of two state departments, eight municipal departments and fourteen research centres. Fifty-one

industrial inspections were made through factories and plants. A total of forty-four reports, petitions and briefs were received. Two hundred and twenty-six individuals made personal appearances before us. Many people and several Ontario municipalities still desire to present their evidence to the Committee.

Following is a partial list of some of the principal sources of pollution which have been studied by the Committee, together with the control methods being used where such existed:

Automotive exhausts, (gasoline and diesel); Automobile Manufacturing; Carbon Black Manufacturing; Cement Manufacturing; Chemical Manufacturing; Cupola (foundry); Furnaces, (coal and electric); Incinerators, (industrial and domestic); Metal Reclaiming; Paint and Varnish Manufacturing; Petroleum Refining; Plastic Manufacturing; Power Plants, (Light and Heat); Pyrites Roasters; Railroad Locomotives; Rubber Tire Manufacturing; Shipping; Smelting; Soap Manufacturing; Synthetic Rubber Plant; Iron and Steel Production.

Of the foregoing, coal-burning railroads, shipping and pyrites roasters have been visited in Ontario, but these operations especially require further study in the United States where, according to reliable authorities, their emissions are being regularly and consistently satisfactorily controlled.

Some of the other important sources of pollution yet to be observed and requiring further investigation are:-

(a) ASPHALT MANUFACTURING - There are said to be adequately controlled plants in the eastern United States.

(b) BRICK MANUFACTURING AND BURNING - Apparently this Ontario problem was solved in England many years ago.

(c) COKE MANUFACTURING - Controlled equipment is to be seen in Cleveland, Pittsburgh, and other cities.

(d) INCINERATORS - Municipal incinerators of modern type should be visited.

Apartment incinerators are in extensive use in New York City and cause a vexatious problem wherever they exist. New York is, however, pioneering in this type of incineration and might obtain improved performance as the result of the extensive testing and experimentation now being carried on.

We are aware that inadequate and improperly operated incinerators are in use in the Toronto area at present, and if many more are permitted in Ontario, the problem will become serious and costly. It is estimated that more than 25% of the severe Los Angeles problem is caused by home incineration methods.

A few cities in the United States have been persuaded by manufacturers that it will "save the municipality money" to dispense with municipal garbage collection and to make the home owners dispose of their garbage by individual incinerators. This, we are convinced, is false economy. The saving of relatively small amounts of tax money by avoiding municipal garbage collection and making individuals burn their own waste is not only a nuisance, it is costly folly. Other cities have discovered to their sorrow that the expense of individual incinerators, plus the cost of the damage they cause, is far greater than any so-called "saving" they make by doing away with municipal garbage pick-up.

Domestic incinerators in many parts of the United States are indeed a very major problem. As a result, manufacturers, having been forced to abandon many American sales outlets, are now attempting to sell their products in Ontario. The choice of prohibition as against control will become much more difficult if domestic incinerators are introduced here in any great numbers. At present, we are most fortunate in not being plagued by the backyard burner with its evils of amateur operation and incomplete combustion. Prompt investigation and decision are necessary to avoid here this type of nuisance which is causing such distress, expense and disease in many American cities.

(e) POWER, LIGHT and HEAT - Power generating stations which are coal fired have been visited, but none where the problem of

sulphur emissions has been prominent. Acute sulphur effects and corrosive action have been suspected in Toronto, making sulphur investigations here important.

In New York City sulphur emissions have caused much property and clothing damage, and corrective action has been ordered there.

In England, it has been estimated that $750,000,000.00 will have to be spent to control only one-third of their present sulphur emissions.

The cost of installing this corrective equipment is four or five times as great after a power plant is built and operating than it is for a new plant installation. For this reason, and since the need for power in Ontario is steadily increasing, investigation into the resultant pollution control requirements here is essential.

The securing of basic scientific information regarding each air pollution problem, before attempting its solution, is most important. We were told of two cases in one city, for example, in which the proper scientific data saved money to an amount exceeding $140,000.00.

The sampling, measurement, analysis and detection of air pollutants are procedures about which the Committee still has much to learn. We have observed the use and operation of various types of dustfall collectors, of sulphur dioxide recorders, high volume samplers, smudge and staining filter samplers, ozone samplers, the Ringelmann Chart, infra-red spectrometers, to mention a few pieces of equipment studied. However, we should also give attention to radio-active analysers, directional collectors, visibility and haze measurement, stack sampling equipment, electrostatic and thermal precipitator samplers, impingers, odor samplers, scientific stack emission viewers, and many other kinds of equipment not yet seen.

The matter of proper standards of measurement of pollutants also must receive our attention. Most ordinances and by-laws enacted for the control of emissions of pollutants from stacks, and other sources, have standards indicating the maximum

permissible concentrations of pollutants in the source gas stream. The Alkali Works Act of England, when it was enacted in 1863, adopted this method long before any similar action on this continent. This procedure has withstood the tests of nearly a hundred years, but something more might be necessary.

As opposed to emission limits of pollutants measured right at the source, the use of general atmospheric limits is, so far, unusual. However, the latter standard of control has been recently established in one very progressive United States jurisdiction, and in ten years or so it might be required in Ontario. Work by the United States Public Health Service and other research organizations is under way to ascertain the atmospheric limits which should be permitted. Such results as have been obtained so far in this research, and from other active air pollution research which is expected to show definite progress or reach final conclusions in 1956, should be obtained for our deliberations.

In general, the Committee is already satisfied that advances in science have now made it technically possible to eliminate, or satisfactorily to control, almost every kind of air pollution.

Authorities we have consulted are unanimous in stating that it is not only economically feasible, but necessary, to put adequate controls on all sources of air pollution.

There are, however, a few types of pollution which require more scientific study, and many methods of detecting and controlling or eliminating them require further investigation and development. One of these is the exhaust of internal combustion engines.

The major automobile manufacturing companies are at present pooling their facilities and scientific brains in a vigorous attack on the problem of automobile exhausts. These companies are currently spending their money on this research at the rate of more than one million dollars per year. One of their top officials, speaking for all of the companies, told us that they confidently

expect to have a practical answer to this question early in the year 1957.

When practical equipment is invented to control the pollutants in automobile exhausts, it would be highly desirable to make such equipment mandatory on every car in Ontario.

4. AIR POLLUTION IN SIMPLE TERMS

Air pollution is the result of the excessive use of the atmosphere by man for waste disposal, combined with certain predisposing and contributing factors provided by nature. Man's part constitutes emission into the air of smoke, soot, fly ash, cinders, dusts, gases, vapours, fumes and odours. Nature's contribution might be a topography which hinders winds in their efforts to disperse man's air-borne garbage, it might be humidity and fog, it might be too much wind or no wind at all, it might be just plain sunlight which catalyzes reactions in the air between various of man's contaminants, it might be a "temperature inversion", or it might be other conditions or combinations of conditions.

A word of explanation should be said about the term "temperature inversion". This is a meteorological condition composed of a layer of warm air, maybe one or perhaps two thousand feet in thickness, which rides like a lid on top of five hundred or a thousand feet of cooler ground level atmosphere. This phenomenon effectively prevents man's pollutants from rising above the bottom of this "inversion layer". As a consequence they continue to concentrate, to inter-react and to annoy. If the process continues for a short while, the "saturation point" of contamination is reached and mucous membrane irritation and other ill effects become immediately apparent to humans and animals. If the condition persists long enough death is the consequence for many. "Long enough" has meant, in several instances, only four, five, or six days.

There exists a close relationship between topography and weather conditions, and the concentration of air contamination present in an area during any given period of time.

The normal condition of the atmosphere is for the air nearest the ground to be the warmest, and for the temperature of the air to drop, gradually, the higher it is taken above the ground level. In this normal situation pollutants are dispersed horizontally by winds, and upwards by vertical convection currents, or by the usual upward movement of parcels of warmed air which rise naturally, as with smoke and heated gases from a chimney.

However, if the winds are very light, or if there is no wind, horizontal dispersion may stop completely. Mountains, hills, tall buildings and other obstructions will also block horizontal wind assistance to a greater or lesser degree depending upon their size.

In addition, vertical dissemination of pollutants may also be checked by the "temperature inversion blanket" over the ground layer of cooler air preventing the usual upward movement.

The two conditions of no horizontal displacement and blocked vertical escape often develop together at the same time as the surface air cools down during the night. This situation occurs most frequently during the late Summer, the Fall and the Winter months, with the resultant accumulation of smog cutting off much of the direct sunlight and preventing the ground and the ground layer from heating up as they should, and thus creating a "vicious circle." The contaminants which continue to be exhaled by man, his processes and his devices, continue to accumulate beneath the inversion "blanket" or "lid" until finally, strong, favourable winds do arrive to disperse the smog and bring welcome relief.

Following is a summary simplified classification of air pollutants and what they can do.

(A) WHAT AIR POLLUTANTS LOOK LIKE:

(i) LARGE PARTICLES - By "large" we mean the size of the "cinder" which gets in your eye, and which you can see and remove. These fall to earth relatively quickly and form a major part of the "dustfall" which is collected in many cities and reported as so many "tons per square mile, per month" or "per year".

(ii) SMALL PARTICLES - These are so minute that they remain in suspension for long periods of time and can travel with air currents for many miles. They form a part of the haze which hangs like a pall over our cities. They penetrate into the depths of our lungs. Pollen, "radio-active fall out" and fumes produced by the volatilization of elements are three special classes in this group.

(iii) LIQUID DROPS - These may be very small drops, (for example of an acid or some other chemical from an industrial process), which can be carried in the air for relatively short distances and create a "spitting distance" nuisance, or they may remain suspended as a "mist" for a period of time.

(iv) MICROSCOPIC DROPLETS - These are the size of the extremely small droplets in cigarette smoke and smaller. They may be droplets of oils, or other liquids, so small that one of them alone cannot be seen by the naked eye. However many of them together

(iv) MICROSCOPIC DROPLETS continued — will produce a blue cloud - a definite smog haze. They can be carried for very great distances in the air.

(v) VAPOURS and GASES - These may be merely an odour nuisance factor. However, they may be either annoying or damaging in themselves, or may react in the atmosphere to produce other irritating or dangerous compounds.

(B) WHAT AIR POLLUTANTS DO:

(i) SOILING EFFECT - (a) Dirty Black or Brown: This type of soiling shows up on laundry, clothing, drapes, furniture, inside walls, the outside of buildings, etc.

(b) Creamy or White: This is the dust you have to wipe off your furniture and automobile.

(ii) PROPERTY DAMAGE - Both of the soiling effects can cause definite property damage by abrasion and in other ways. In addition to the surface dirt, which may be difficult to remove and be a cause of damage in the removing process, there are chemical effects which result in -

(a) Paint damage.
(b) Corrosion of metal, wood, stone, cement and fabrics.

Aside from specific damage, property values are invariably lower in dirty, smelly areas.

(iii) VEGETATION DAMAGE - This may be "obvious" and even amount to complete death of the crop or plants. It may be "imperceptible" or "hidden", in which case the plant and the fruit appear normal at first glance, but are actually smaller and of inferior quality than the normal. There are special circumstances in which cattle and other livestock may be killed or injured by eating vegetation which has had some specific air pollutant settle on it.

(iv) NUISANCE - This may be an offensive odour, or an irritation to the eyes, nose, throat, bronchial tubes, skin, etc.

Nuisances are usually created by specific offenders who cause annoyance and interfere with the rights of their neighbours to enjoy their homes and property. Many nuisances exist in Ontario. The word "nuisance" cannot be exactly defined at present for legislative purposes, and a review of legal cases is necessary to ascertain the rights of the public and the duty of the province to protect the public when the nuisance originates from such sources as railroads and steamships.

The control of odours by the masking of them with some chemical is being promoted by certain organizations, but the desirability of this solution is widely debated and some authorities forbid this form of "control".

(v) SKY DARKENING - Pollutants can cut out much of the sun's light and other beneficial radiation. This may contribute to the spread of infectious diseases and can increase the severity of mental depression.

Reduction of sunlight intensity solely because of air pollution has been as high as 75% in some cities, and occasionally even higher. This

appreciably shortens the length of the day, causing increased expense by making it necessary to use extra electric light for longer periods of time.

(vi) VIEW IMPAIRING - This not only causes loss of landscape beauty and of the aesthetic appeal of man's buildings, but can be a definite hazard and the cause of accidents in ground and air travel. This also contributes to mental depression and irritability.

(vii) HEALTH DAMAGE - This may be physical and/or mental detriment. Depending on the nature of the air pollutants present, their concentrations, inter-reactions and duration, this health damage can range in degree from mental depression and loss of normal mental and physical efficiency, through "chronic bronchitis" and allergic manifestations, to lung cancer and death.

As far back as 1932 and 1933, the United States Public Health Service made a survey of American cities with regard to disease as related to air pollution. One of the obvious conclusions from that study was that the four most polluted cities in those years ranked in the same order as their degree of air pollution in the matter of the number of pneumonia deaths per year. Pittsburgh was found to have the most severe air pollution and it also had the greatest number of pneumonia deaths in the United States per 100,000 population. Pittsburgh was followed by Boston, Baltimore and St. Louis, which ranked in that order in parallel positive correlation between diminishing amount of air pollution and decreasing incidence of pneumonia deaths.

"British bronchitis" and the high incidence of other respiratory diseases in Great Britain have been well known for years. The British consider air pollution to be responsible for these persistent chest ailments. This belief was substantiated by recent events in Liverpool and other overseas cities.

Early in 1956, J. A. Scott, O.B.E.,M.D., M.R.C.P.,F.R.S.H., the Medical Officer of Health for the London County Council, in commenting on Sir Hugh Beaver's "Clean Air Bill," was quoted in the Journal of the Royal Society For the Promotion of Health, (Vol. 76, No. 1, January 1956), as saying:

> "The four-day fog of December 1952, caused at least 4,000 deaths in the Greater London Area. It is not too fanciful to compare it medically to an acute exacerbation of a chronic illness, or to an epidemic flare-up of an endemic disease. Certain it is that atmospheric pollution in this country exacts a regular toll of ill-health and death quite apart from its considerable economic effects."

Various statistical studies made in England, Wales, the United States of America and Denmark show that the mortality from lung cancer is much higher in urban areas than in rural.

In Ontario, vital statistics indicate that male deaths from malignant neoplasms of the trachea, bronchus and lung are unexpectedly high in Toronto and Windsor; from cancer of all forms in Hamilton, Ottawa, Toronto and Windsor; from pneumonia and bronchitis in Toronto; and from respiratory tuberculosis in Ottawa. (The data from other large Ontario cities were not analyzed in this survey.)

On the other hand, deaths from cancer of the trachea, lung and bronchus, from cancer of all kinds, and from pneumonia and bronchitis are unexpectedly low in the rural Ontario areas and in Ontario municipalities with populations less than 15,000.

The reasons for these differences between incidence of disease in urban as compared with rural areas cannot be definitely stated from the evidence now available, because there are many variables which may be involved as causes of respiratory disease in addition to the amount of air pollution encountered. However, it is reasonable to assume that at least a large part of the reason for the greater incidence of cancer, and other diseases of the respiratory system,

in the large centres is the greater concentration of air pollutants to be found in those places.

Because carcinogenic substances can be isolated from the smog atmosphere which is breathed by those in large cities, and for other reasons, several responsible medical authorities have unequivocally named air pollution as a major cause of respiratory cancer. Every year more authorities are expressing the opinion that severe injury to health is being produced by air pollution.

As we have indicated, although scientific evidence about the effects of air pollution on human health is far from complete, enough proof exists to make it abundantly and increasingly clear that air pollution is injurious to both physical and mental health. Under certain combinations of circumstances it can be fatal. It fosters disease, and it is very probably a major cause of lung cancer, if not of other forms of malignancy.

Although intermittent lethal episodes have terrified people in the vicinity and aroused their indignation, it is becoming progressively more apparent to the Committee that more important is the continuing daily damage being done to the efficiency and the health of urban dwellers. Therefore, it is important that effective control measures be taken by even those municipalities where the local air pollution problem is still in its early phases.

As Ontario urban centres increase in size, in population, and in automobile registration, severe difficulties produced by the resultant air pollution are inevitable unless corrective measures are instituted early.

In order to have air pollution control measures undertaken before an acute situation develops, considerable public understanding and support are required.

5. PUBLIC SUPPORT REQUIRED

It appears to us, at this stage of our work, that there are many preventive measures which should be practical for adoption on short notice, while others must involve special scientific study together with protracted public education and guidance, in order to achieve the ultimate goal of pure air in spite of modern living conditions.

Experience elsewhere in the last five years has demonstrated the value of, and the need for, proper public understanding in this field. It is clear that if the people are not informed in advance, when an air pollution situation becomes acute and they clamour for laws which will provide immediate relief, they are likely to get faulty and expensive laws as the result.

One large centre neglected public education for several years and, although the air pollution control officials were doing technically good and useful work, the public did not realize the extent of the problem, nor the Hurculean task of correcting it. Considerable trouble developed from this lack of understanding.

As a result, it was found necessary to have the municipal air pollution control department staff include a Public Services Officer in charge of a General Information Division of seven experts in education and public relations. Various informative publications are available, and pamphlets and bulletins are frequently issued. These are distributed to a mailing list and also may be ordered from this division by telephone or mail.

Forty-two university trained experts on the staff of the Air Pollution Control Department have been organized to form a Speakers' Bureau. The speakers are specialists in all the various aspects of air pollution - control, enforcement, engineering, research, meteorology, education, etc. They will provide lectures on any or all phases of the problem and its control. Their talks are amply illustrated by excellent motion pictures, slides, photographs, graphs, displays and other illustrative material.

On request, the Speakers' Bureau will provide a program suitable to the needs of the group requesting it. The length of this program may be anything from a half-hour after-dinner talk to a full two day detailed course of instruction. To illustrate the demand for this service, during the one month of September 1955, one member of the General Information Division delivered 129 speeches to service clubs, school teachers, church associations and other civic groups in the area. These talks are not only informative, but are also entertaining and designed to stimulate intelligent public interest, thought and action.

As the situation exists at present in Ontario, it is unlikely that we will require such a large public relations staff. However, the matter of public education and the best way to achieve it must receive serious consideration and must not be neglected.

In Great Britain also, Sir Hugh Beaver (the Chairman of the British Government Committee on Air Pollution), realizes the value of strong public support for air pollution control. He recently blamed lack of public knowledge for the 700 years of ineffectual attack on the progressive air pollution conditions which culminated in the four-day smog of December 1952, causing "at least 4,000 deaths in the London area" and the resultant appointment of Sir Hugh's Committee. Sir Hugh Beaver, in speaking about smoke, said "both criticism and attack have been violent enough, and I think one may well feel surprised how, generation after generation, the evil has been described in such scathing terms and the practicability of effective action so repeatedly demonstrated - and yet nothing, or almost nothing has been accomplished."

Sir Hugh has commented on the many committees which have been appointed through the years by the British Government. He quoted from the concluding paragraph of the report made by the committee which preceded his by 33 years: "No Government has for many years taken any action with the exception of appointing committees whose labours have led to little or no result."

Sir Hugh pointed out that 700 years ago the then Queen of England moved out of the city of Nottingham where she was residing "because of the insufferable smoke"; and that some 300 years later the brewers of Westminster offered to burn wood instead of coal because of the allergy of Queen Elizabeth I to coal smoke. But it was only about the end of her reign that feeling began to lead to action; and then there was a prohibition - "probably ineffective" - of the use of coal in London "while Parliament was sitting!"

Sir Hugh states "experience has shown that on public opinion, and on it alone, finally rests the issue." He goes farther to say: "Good legislation itself will be ineffective unless public opinion supports its enforcement."

A recent survey of leading industrial corporations in the U.S.A. found that top management in that country classifies air pollution as "a major public relations problem." They say that there is "an increasing and more aggressive public awareness of air pollution as a nation-wide issue." They advise all industry to tell its neighbours in the communities where plants are located just what they have done and are doing to control air pollution, and how much it is costing. "Industrial air pollution is frequently as much a public relations as an engineering problem."

Industries who have kept their neighbours informed in this way have told us that the dividends returned in public appreciation, gratitude, good will and general public relations, could probably never have been bought with the cost of the control equipment purchased.

This Committee believes that the public should be made aware and kept well informed about the causes, effects and methods of prevention of smoke and other types of air pollution. Understanding of this subject will create a strong supporting public interest.

This general support is needed because air pollution control is apparently often an expensive process. Wherever this money comes from, in the last analysis it has to be paid, one way

or another, by the individual citizen. Hence, he should be informed that, while it is a costly business, it is one which we cannot afford to neglect any longer. He should know that such spending is more than highly desirable, it is absolutely necessary. He should realize the tremendous cost in dollars and in loss of health and comfort which we are all paying today for damage done by air pollutants. Elsewhere, other people have already had to learn this "the hard way". He must be convinced that air pollution control will pay worth while and substantial dividends to him and his family in health, comfort and cash saved.

When people know they are getting good value for their money, they do not object to the expenditure. In Detroit, for example, $18,000,000. has been spent on air pollution control equipment alone in the past seven years. Several officials of that city stated that they have never heard "even a suggestion" that one penny of the money was being wasted, or spent for an unnecessary purpose.

"Mr. Average Citizen" should also know about air pollution because he is one of the causes of it. From our studies, it is obvious to us that industry is not alone to blame for polluted air and that it behoves every individual to be his own constant smoke inspector. For example, he should not burn leaves, trash, or other open fires in his yard; he should not buy a home incinerator; he should learn how to properly and economically heat his own house, and he should keep his automobile, truck or motor cycle in good repair and adjustment so that it runs as efficiently as possible and does not emit a smoky exhaust.

The practical experience of others, and many reasons, indicate to us the need for public information and understanding on this subject to be extended and for a strong public interest supporting air pollution control to be aroused. While we are not prepared at this time to recommend by what method or methods this should be accomplished, we must not forget that the enactment of a strong law with no exemptions, and "with teeth in it," will, itself, do much to educate industry and the general public in this vital matter which affects each one of us.

6. THE COST OF AIR POLLUTION

The cost to the citizens of Ontario of existing air pollution can only be given as a considered guess. This is because there is no giant provincial ledger in which is recorded the cost of wasted fuels, of property damage and depreciation, of extra laundry and cleaning bills, of additional electricity used, of injury to plants, crops, soil and animals, and of other expenses caused by our polluted air. Also, no one can estimate in dollars the cost of air pollution inspired discomfort, loss of efficiency, illness, misery, work loss and premature deaths.

However, careful surveys have been made in Great Britain and in several United States cities which provide at least an estimate of the order of magnitude of the waste caused by air pollution. These survey reports all emphasize the fact that the figures quoted are on the conservative side and are also low because only those costs are considered which can be measured in terms of money. Such items as discomfort, loss of efficiency, loss of health and life, effects on transportation, losses from retarded growth of crops and cattle illness, the unpaid extra labour of housewives whose work is considerably increased in polluted areas, etc., are not included in the estimates.

In Great Britain the cost per person per year is estimated to vary from $15.00 for the overall population to at least $30.00 for those living in "the black areas."

In Chicago, a recent estimate gives the amount of $20.00 per head of population per year, and in Greater New York the figure has been set at $16.00 per person.

In the City of Pittsburgh, an estimate of the expense of air pollution, made before action was begun to control it, placed the cost at about $20.00 per person per year. However, the 1952 Report of the Bureau of Smoke Prevention of Pittsburgh estimates the annual saving within the city limits resulting from the elimination of smoke at a total of $27,000,000.00 or $41.00 per person per year.

Since there is some evidence to indicate that Toronto air now has approximately the same degree of pollution that Pittsburgh suffered before the "clean-up" there, it is reasonable to assume that the polluted air in Toronto at present costs each citizen at least $40.00 annually. It is also probable that the expense per person in other Ontario metropolitan areas runs somewhere between $25.00 and $40.00 per year, depending on the amount of the local air pollution.

It would be a very conservative estimate to say that in the next five years our friends in the United States will spend more than fifty million dollars on air pollution research alone. Without giving the large figures for the spending by State Governments and by privately financed corporations for air pollution research, the fact that the United States Federal Government has made available for research in this field the sum of five million dollars per year for each of the next five years indicates the tremendous importance which is attached to this problem by all the best experts across the border.

It would be impossible to say exactly how much money will be spent by industry during the next five years for equipment to control air pollution. However, the results, published in 1956, of a careful U.S.A. survey of leading industrial executives and of the air pollution control officials for 67 major industrial cities, will give us some indication of the great concern which air pollution problems are causing in that country. They also point the way in which we should follow.

69% of industry surveyed reported expenditures made in the last five years to control air pollution ranging from $1,700.00 to $20,000,000.00 per company. Only 5% of the corporations reported no expenditures made for this purpose in the past five years.

35% of the companies said they thought they had already solved their air pollution problem. Another 30% of them felt that they were well on the way to having it solved.

27% of the industries reported plans for expenditures estimated to range from $50,000.00 to $15,000,000.00, per company, over the next five years to control their air pollution.

The twenty companies whose plans have progressed so far as to enable them to give detailed dollar estimates reported expenditures to be made over the next five years which will total $52,730,000.00.

Only a very few industries said there would be no need for them to make further air pollution control expenditures.

74% of the corporations said that major consideration is always given by their executives to air pollution control when their companies plan new construction. Only 8% of the industries said it was not a problem with them.

Experts in the United States have told this Committee that it is not unreasonable for the average industry to spend between 2% and 5% of its capital cost on air pollution control equipment, and that such money is always well spent.

In the very rare instance, where an unusual pollutant is exceptionally difficult to control in an old established factory, companies have invested as much as 10% to 20% of their capital expenditure for control purposes.

It has been repeatedly emphasized to us that these expenses frequently may be from two to five times as great when the correction is applied to an existing operating plant, than they are when control equipment is installed at the time a factory is first erected. We commend this fact to the Legislative Assembly, and to the consideration of industries which are contemplating the construction of new factories, or additions to existing plants.

We have discovered no instance of an industry being prejudiced in its operations by being required to install air pollution control equipment. Because air pollution is almost always a sign of waste, money spent on air pollution control equipment usually brings a substantial

return and sometimes is a profitable investment.

The individual who resides in a rural part of the province should not assume that he is free of the burden of air pollution merely because he lives in the country. In addition to the fact that he has to pay for money wasted in the cities, because the cost of urban air pollution must be reflected in the increased price of the city-made products which he purchases; he must also remember that masses of polluted atmosphere can be and are carried by air currents many, many miles from their sources. They may even be regularly, or on occasion, dumping aerial garbage on his farm.

For example, in the late 1920's Stevens County in a very remote section of northwestern Washington State was reported to have become a scene of devastation, with the crops dying, orchards barren, the soil no longer able to produce grass for livestock, and farm machinery corroding in its sheds. An International Commission appointed to investigate found the cause of the destruction to be sulphur dioxide diffused into the air by a smelter in Trail, British Columbia. The smelter was located up to a hundred [redacted] miles away from the damage produced by the pollution it spewed into the air.

This international incident vividly illustrates two facts:

(a) Even the farmer living remote from a metropolitan area or other source of air pollution should have and take a real interest in air pollution control, and

(b) neither provincial, state nor national boundaries are barriers to the spread of atmospheric pollution.

7. THE INTERNATIONAL ASPECT OF AIR POLLUTION

There is a large international aspect to this problem which the International Joint Commission has been studying for several years in the Windsor-Detroit region.

The situation in the Sarnia-Port Huron district also reached international proportions and the Ontario Research Foundation has been working there, with the full co-operation of local industries in Sarnia.

Elsewhere along Ontario's border with the United States, air pollution problems from each side are affecting the other.

The International Joint Commission is to bring before the Federal Governments of the United States and Canada, in April 1956, its findings and recommendations from the Windsor-Detroit work.

The life of this Committee should be continued so that it can attend when the International Joint Commission's recommendations are being made, because it is not possible to legislate intelligently regarding air pollution control unless the international aspects of the problem are fully considered.

As there seems to be some difference of responsible opinion as to where the legislative power lies with regard to some aspects of air pollution control, it would be most desirable for this Committee to receive the benefit of the findings and deliberations of the International Joint Commission before attempting to formulate any provincial legislation for recommendation to this House.

Also, the Committee has been invited to attend the International Meeting of the Air Pollution Control Association which is to be held in the Niagara Falls-Buffalo-Fort Erie district during the last week of May, 1956. This meeting is to give consideration to the solving of the several international difficulties which are caused by air pollution originating from both sides of the Niagara River border.

8. AIR POLLUTION CONTROL EQUIPMENT

With regard to the equipment used to control air pollution, the Committee requires more time for study. We have learned that some well-

advertised equipment in this field does not live up to the claims made for it by manufacturers, and some definitely does not give satisfactory results.

It is extremely difficult for the uninitiated individual, industry or municipality to make an intelligent choice of the proper control equipment to solve the problem at hand, because of lack of accurate knowledge, and the ability and methods to verify the manufacturers' claims before the equipment is ordered and installed.

As most air pollution control equipment is quite expensive, mistakes in selecting it can be costly. Hence, it would be desirable if this Committee could make recommendations concerning standards and procedures for the guidance of those who have the task of approving, or rejecting, control apparatus. Or, alternatively, if we might better give consideration to the establishment of an organization to provide such assistance on a continuing basis.

This subject of control equipment requires further study and consideration on our part as it has not been possible for us to give it more than a small amount of our attention.

9. AIR POLLUTION CONTROL METHODS

Every piece of legislation and each local by-law and ordinance which has been examined by this Committee has suffered from some serious defect or deficiency so far as Ontario application is concerned.

The failure of existing laws to properly achieve their purpose has been due to many factors. One of the most important of these has been failure to keep the provisions of the legislation abreast with scientific knowledge and technical progress. For example, there are certain industries which are effectively exempted by our Ontario Legislation because municipalities consider the method provided for bringing such industries under the provisions of their air pollution control by-laws much too cumbersome,

uncertain, time consuming and costly. The idea of these "exemptions" originated in the 1800's at a time when the types of pollution concerned could not be controlled. They can be controlled today, and some of them have been controlled satisfactorily in other countries for years.

Other common factors which produce partial or substantial failure of air pollution control laws are difficulty or expense of enforcement by the municipality, the municipality not providing suitable or sufficient testing equipment for its enforcement staff, the use of untrained or inadequately trained enforcement personnel, the lack of informed public opinion and, last but not least, inadequate penalties. In one jurisdiction, for example, the fine of $100.00 for open fires was not sufficient to deter building wreckers from buring scrap lumber and other waste materials on the site of each wrecked building. It cost the wrecking company $300.00, or more, to dispose of the material by hauling it away. Therefore, its employes were instructed to "always light the fire even if the fine has to be paid," and they "often did not get caught."

One standard model by-law for recommendation to each municipality in the province is not considered by this Committee to be the most satisfactory solution to the problem of enforcement of air pollution control measures.

Each municipality is like a patient whose condition requires a personal examination and diagnosis, and whose health demands an individual treatment to achieve a successful result.

The field of smoke abatement appears to be such that its problems can be dealt with adequately at the local level in most cities, except possibly where a smoke nuisance originating in one municipality affects a neighbouring centre, thus raising a jurisdictional issue.

This is not true, however, with other types of air pollution. Most pollution problems are complex and only the very largest cities can afford to engage properly trained personnel, or to supply the necessary equipment required to handle the difficulties encountered. For the

majority of air pollution problems, the technical difficulties appear to be so serious as to require a substantial measure of provincial participation in a control program.

We have discovered that municipalities with less than about 100,000 population cannot justify the expense necessary to provide the technical investigation and proper enforcement of air pollution control measures. Even cities with under 1,000,000 people are limited in their ability to reasonably handle complex air pollution problems. They require outside help.

Several representations from Ontario municipalities and Ontario industry have either suggested or reuested that a central Provincial Government agency be established to give scientific assistance, to lend scientific instruments and to give technical advice to them. The Ontario Research Foundation has also recommended a similar Provincial policy. In England, air pollution work involving any problem that is at all technical is done by a central agency. It would be desirable to give consideration to the providing of some similar central assistance agency in Ontario for this purpose.

With further investigation, study and consideration, this Committee believes that effective, flexible provincial legislation can be devised for recommendation to the Legislative Assembly which will be applicable to the needs, and within the financial and enforcement capabilities of Ontario municipalities of all sizes, from the smallest town to the largest metropolitan area.

10. AUTOMOBILE REGISTRATION AND AIR POLLUTION

The role of automobile exhaust in smog formation has been emphasized by the Los Angeles situation. Authorities there believe that about 50% of their problem is caused by gasoline powered vehicles.

There is a great amount of information available on the volume and composition of automobile exhaust gases with regard to the "major" components, viz: carbon dioxide, carbon monoxide,

water vapour, hydrogen, nitrogen and oxygen. However, until very recently knowledge has been only fragmentary with regard to the other constituents, which are unburnt, or partially burnt, hydrocarbons and which are alleged to be the principal contributions of the gasoline engine to smog.

The internal combustion engine is designed to be operated under "rich mixture" conditions, i.e. insufficient air is taken in to permit complete combustion of the fuel. Therefore, part of the fuel passes out the exhaust pipe only partially burned, or completely unburned. There are, of course, other irritating emissions from cars, e.g. from crankcase breather pipes which contain decomposition and oxidation products of lubricating oil. Also, whenever a driver buys gasoline and has it put into his empty tank, an equivalent volume of concentrated, unburned, gasoline vapour is expelled from the tank into the atmosphere as the gas is poured into it.

Professor Haagen-Smit has done, and is doing, a great amount of work on the problem of automobile exhaust products and their effects. His theory, which appears to fit the facts, says that the auto exhaust hydrocarbons, in the presence of nitrogen dioxide, (and maybe other air contaminants), in concentrations of the same order as those experienced in Los Angeles, react, in the presence of sunlight and are converted into oxidation products, which are responsible for the eye-irritating, plant damaging, and reduced-visibility characteristics of smog.

The intermediate reaction products are believed to break down to form ozone, which, in turn, may further oxidize certain of the hydrocarbons in the air, principally the olefins. Some of these intermediate products, and the ozone itself, are believed to comprise the "high oxidant" content of the Los Angeles atmosphere and are the cause of the rapid deterioration of rubber experienced in that region.

The presence of sunlight is necessary for the reaction to take place between nitgrogen dioxide and the hydrocarbons to form ozone and

other oxidants. However, once they are formed, the further reactions between the oxidants and hydrocarbons is not influenced by the presence or absence of light and therefore can continue after sundown. That is why the concentration of oxidants in the air is high during the daytime sunlight and then decreases markedly at night as they are used up in the second stage reactions.

While the mountains around the rim of the Los Angeles "basin" tend to prevent dissipation of these pollutants, it must not be assumed that such a topography is required for the pollutants to reach the concentration necessary to produce effects attributed to the hydrocarbon-auto-exhaust type of pollution. As automobile registration steadily increases, more and more cities are experiencing the type of irritation which was first noticed in Los Angeles. Already more than 25 of the 100 largest cities in the United States have reported that eye irritation occurs occasionally, which indicates that the atmosphere over those cities is on the verge of reaching its "saturation point" for these pollutants. In Ontario we received reports of eye-irritating episodes in Sarnia, and it is probable that much of the relatively mild eye-irritation experienced on sunny days in down-town Toronto may be attributed to the same cause.

"Synthetic smog" has been prepared directly from hydrocarbons and also from actual automobile exhausts. Haagen-Smit was the first to do such experiments under the auspices of the Air Pollution Control District of Los Angeles. Now, many scientific investigators of the highest calibre are at work on the problem, financed by the Air Pollution Control District, the Air Pollution Foundation, Federal and State Government Grants, and by private industry.

The Stanford Research Institute has done considerable research on smog and has reported that "gasoline vapors, mixed with ozone so that visible fuming occurred, caused plant damage in six hours with concentrations as low as 3 parts per million of regular gasoline and 0.4 p.p.m. of ozone. The same degree of damage was produced by exposure for five hours to a mixture of 2 p.p.m. of premium-grade gasoline and 0.4 p.p.m. of ozone."

This confirms the earlier experiments along this line which were done by Haagen-Smit.

The number of vehicles registered in Los Angeles County increased from 871,773 in 1930 to 1,229,194 in 1940. However, with that concentration of cars there were no apparent "hydrocarbon-oxidant" air pollution effects. Finally, about 1946 these effects were beginning to be generally noticed by many people. By 1953 the number of vehicles in the County had risen to 2,427,566, which represents 412 motor cars per 1,000 persons. By 1953, the smog effects had become acute, severe and frequent. At the beginning of 1955 the registration had increased to about 460 cars per 1,000 population. The eye-irritation and other hydrocarbon-oxidant effects became more frequent and more severe as a result, inspite of strenuous and expensive efforts which have been made to control other types of air pollution.

In Ontario the concentration of cars was about 280 cars per 1,000 persons in 1954. In Metropolitan Toronto the estimate is about 310 cars per 1,000 population for 1955.

In 1945 there were 158,000 motor vehicles registered in York County. Today it is estimated that there are 440,000 vehicles registered in the Toronto planning area which is bounded by Clarkson, Richmond Hill, Ajax and the shores of Lake Ontario.

Actual traffic count shows that ~~133,500~~ and leave 66,750 vehicles enter the downtown Toronto area in the fifteen hour period from 7 a.m. to 10 p.m. on an average week day. This figure does not include the lakeshore traffic which by-passes the downtown area, nor does it include the cars which are left in the parking lots on the waterfront.

In 1949 the motor vehicle registration for Ontario was 955,307. This figure rose to 1,083,943 in 1950 and to 1,459,966 in 1954. The Provincial figures for 1955 are not available to us at this time. However, in the five year period from 1949 to 1954, the motor vehicle registration in Ontario had increased by 504,659, i.e. by more than 100,000 cars per year. This is an increase of more than 52% in a five year period.

The leading automobile manufacturers are at present pooling their research facilities, their brains and money, to the extent of more than one million dollars per year, to improve the quality of automobile exhaust from an air pollution standpoint. It is probable that a new type of carburetion will be developed which will give a more perfect combustion of the fuel and also that some type of catalytic exhaust muffler will prove useful to prevent the escape of hydrocarbons into the air.

As soon as effective and practical devices are invented and made available to improve the quality of automobile exhaust, their attachment should be made mandatory on every gasoline powered motor vehicle in Ontario.

11. INTERIM CONCLUSIONS AND IDEAS WORTHY OF FURTHER CONSIDERATION

(a) Everyone inhales from 8,000 to 16,000 quarts of air per day, therefore the purity of our air is of paramount importance.

(b) Air pollution is the result of the excessive use of the atmosphere by man for waste disposal, combined with certain predisposing and contributing factors provided by nature in the form of topographical and meteorological conditions.

(c) Air pollution is not only an expensive nuisance, it is a danger. It is an extravagance which no one can afford.

(d) Control of air pollution is necessary today, but the need for it will become increasingly urgent as the population, prosperity and automobile registration in Ontario increase.

Motor vehicle registration in Ontario is increasing at the rate of more than 100,000 vehicles per year. Hydrocarbon-oxidant effects attributable to automobiles include eye-irritation, vegetation damage, reduced visibility and the deterioration of rubber.

As soon as effective and practical devices to improve the quality of automobile exhaust become available, their attachment should be made mandatory on every gasoline powered motor vehicle in Ontario.

(e) Although scientific evidence about the effects of air pollution on human health is far from complete, sufficient proof exists to make it abundantly and increasingly clear that air pollution is injurious to both physical and mental health. Under certain combinations of circumstances it can be fatal. It fosters disease, and is very probably a major cause of lung cancer.

(f) In general, the Committee is satisfied that advances in science have now made it technically possible to eliminate, or to satisfactorily control, with the exception of motor vehicle exhaust, almost every kind of air pollution.

(g) The problem is certain to gain in severity and public importance until the actual physical discomfort of the man on the street will force him to demand abrupt, drastic and expensive action as he has in Great Britain, Los Angeles, St. Louis, Pittsburgh and elsewhere. The Committee firmly believes that such an agonizing situation can be averted in Ontario through thorough and careful study at this time, followed by appropriate decisive action.

(h) To have adequate air pollution control measures undertaken before an acute situation develops in Ontario, considerable public understanding and support are required.

Elsewhere, the effectiveness of laws, by-laws and ordinances and the degree of success obtained by officials in the control of air pollution appear to be in proportion to the amount of local public understanding of the subject.

(i) The expression "free as the air you breathe" is as antiquated in modern civilized society as the coal oil lamp. Air costs each one of us a substantial amount of money whether it is clean or dirty. It is much more expensive to put up with polluted air than to pay the price of having air that is worth inhaling.

(j) It is not unreasonable for the average industry to spend between 2% and 5% of its capital cost for air pollution control equipment. Such money is always well spent.

(k) Almost without exception, every industry can clean itself up if it will take the trouble and spend the money.

(l) Public opinion determines the pace of industry's attack on air pollution. Top management in the U.S.A. classifies air pollution as a major public relations problem. Industries who inform their neighbours of what they are doing to stop air pollution find that they earn, and receive, rich and unexpected dividends in public appreciation and good will which would be most difficult to gain in any other way.

(m) Prevention is much cheaper than cure. Experience has shown that air pollution control expenses may be from two to five times as great when the correction is applied to an established, operating concern by "fitting the equipment in with a shoe horn", than they are when properly planned equipment is designed for and built into factories, or other buildings, when they are first constructed.

Everywhere the Committee has been where air pollution has developed into an acute and urgent problem, we have been asked to convey hearty congratulations back to the Government of Ontario for having had the foresight to do something about this problem before its consequences here assume such serious proportions and become so obvious to each citizen as to make him vociferously demand quick relief action.

"Panic Legislation" inspired by acute air pollution episodes is unlikely to be effective and will probably be unnecessarily costly. In such cases, since no time is permitted for adequate scientific study to discover the actual cause of the annoyance, any precipitate action taken has a good chance of being misdirected.

(n) The control of air pollution, it should be made clear, is a function which cannot be satisfcatorily administered without the full use of still-growing scientific knowledge, the utilization of technically qualified personnel and adequate laboratory and mobile test equipment, together with the strong support of an informed public opinion.

(o) We have discovered no instance of an industry being prejudiced in its operations by being required to install adequate air pollution control equipment.

(p) The old-fashioned idea was that a smoking chimney is a sign of full lunch pails and of prosperity. Today it is an indication of waste, of bad manners and of a source of unnecessary dirt and work for the housewife. It may also be a sign of full hospital beds. It is neither polite nor proper to dump your garbage on your neighbour's property. Neither is it legal.

(q) Therefore this Committee is of the opinion that there should be no exemptions made in any air pollution control legislation which might be recommended to, or adopted by, this Legislative Assembly.

(r) Because air pollution frequently represents waste, expenditure made for control equipment is, therefore, almost always likely to be a profitable investment. Where chemicals and elements can be recovered by air pollution control methods, the profit therefrom can often more than pay for the installation and upkeep of the necessary apparatus.

(s) However, in the rare instance where control is difficult and unusually costly, it might be considered desirable to extend some financial assistance to the industry concerned.

Or, perhaps in every case, it might be thought wise to extend some financial advantage to those corporations, or individuals, who promptly install the necessary equipment. This advantage might take the form of some

tax relief, or maybe it would be desirable to set up a fund to provide interest-free loans for this purpose.

(t) It is obvious to us that industry is not alone to blame for polluted air and that it behooves every individual to be his own constant smoke inspector. For example, he should not burn leaves, trash or other open fires in his yard, he should not buy a home incinerator, he should learn how to properly and economically heat his own house, and he should keep his automobile, truck or motor cycle in good repair and adjustment so that it runs as efficiently as possible and does not emit a smoky exhaust.

(u) As recommended by Industry and Municipalities, this Committee will give consideration to the advisability of recommending the establishment of a government agency, (for example, a separate division of the Department of Health), with an adequate budget to provide for sufficient technically qualified personnel and adequate modern scientific equipment.

The purpose of such an agency would be to accumulate up-to-date air pollution control information and to provide free advice and assistance to individuals and corporations, (both municipal and industrial), on all problems of air pollution and their solution.

This agency should have sufficient and proper equipment to enable its staff to make surveys and analyses in municipalities and industries with difficult problems. It probably should also be equipped and staffed to carry out research in this complex field. This is no job for amateurs.

The proposed Provincial agency should have direct control over all industry in the province to prevent an industry locating just outside the jurisdiction of any municipality, or in semi-urban areas, to avoid local control.

This agency should be qualified and capable to give reliable advice and information

concerning the type of equipment which would be most suitable and which would provide the most economical results in the control of each type of air pollution problem.

It might be thought desirable to empower such a government agency to set standards from time to time for each type of air pollution control equipment which the manufacturer concerned must meet with his apparatus before it would be permitted to be sold in Ontario.

(v) The Committee is of the opinion that provincial legislation should be enacted to give the municipal authority the power and the duty to control the common and more simple types of air pollution within its boundaries, and, perhaps, immediately adjacent thereto.

This municipal control should include power to cause abatement of air pollution originating from railways passing through the municipality and from steamships moored at docks within the municipal boundaries, or anchored or passing within one-half mile from the municipal shoreline.

(w) We consider that new legislation will be required to control the air pollution from railways and shipping. It is possible that this annoyance may come under Provincial jurisdiction as being a matter of "property and civil rights," or of health. However, our recommendations in this regard should await the findings of the Interational Joint Commission.

Since there is some conflict of informed opinion as to whether provincial legislation, in so far as it would apply to air pollution originating from railways and shipping, would be ultra vires, it might be expedient to pass such necessary legislation on the assumption that the province has the right to legislate concerning such nuisances for which our Dominion authority is not assuming proper responsibility.

Ontario municipalities have been unanimous in placing the blame for a large proportion of their air pollution on railway operation. If our Federal authority continues to neglect this problem as it has to date, and Provincial Legislation is passed to remedy the situation, and if the vires of such legislation were challenged in the courts, it is difficult to conceive that the courts would permit railways to operate so as to discharge an unreasonable and unnecessary amount of smoke with disregard to the health, welfare and convenience of the inhabitants of the various Ontario communities through or near which they travel. Therefore, it would be desirable to pass legislation in this matter and to give the courts an opportunity to express their opinion should the railways see fit to challenge the vires of the legislation.

(x) The Committee wishes to have the opportunity, before making final recommendations, to gather more evidence concerning the amount of control which municipalities can competently and economically exercise in these matters; the problems of central control; limitations and safeguards required; and many other questions in this field for which we do not as yet have the answers.

(y) An individual who resides in a rural part of the province should not assume that he is free of the burden of air pollution merely because he lives in the country. He, too, pays in one way or another for air pollution. He always pays indirectly, but, on occasion, may also pay directly.

(z) Air pollution is a matter of concern to all political parties and transcends party lines just as it knows no territorial boundaries. It is in the interest of everybody in the Province to do a good job on air pollution control.